1. Match the vector fields below with their equations.

   (a) $\mathbf{F}(x,y) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$

   (b) $\mathbf{F}(x,y) = \begin{pmatrix} \frac{x}{\sqrt{x^2+y^2}} \\ \frac{y}{\sqrt{x^2+y^2}} \end{pmatrix}$

   (c) $\mathbf{F}(x,y) = \begin{pmatrix} \frac{y}{\sqrt{x^2+y^2}} \\ \frac{-x}{\sqrt{x^2+y^2}} \end{pmatrix}$

   (d) $\mathbf{F}(x,y) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$

   (e) $\mathbf{F}(x,y) = \begin{pmatrix} \frac{y}{x^2+y^2} \\ \frac{-x}{x^2+y^2} \end{pmatrix}$

   (f) $\mathbf{F}(x,y) = \begin{pmatrix} y \\ -x \end{pmatrix}$

   (g) $\mathbf{F}(x,y) = \begin{pmatrix} -x \\ 0 \end{pmatrix}$

   (h) $\mathbf{F}(x,y) = \begin{pmatrix} \frac{-y}{x^2+y^2} + \frac{-y}{(x-1)^2+y^2} \\ \frac{x}{x^2+y^2} + \frac{x-1}{(x-1)x^2+y^2} \end{pmatrix}$

   (i) $\mathbf{F}(x,y) = \begin{pmatrix} \frac{x}{\left(\sqrt{x^2+y^2}\right)^3} \\ \frac{y}{\left(\sqrt{x^2+y^2}\right)^3} \end{pmatrix}$

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2. For each, decide whether the divergence is positive, negative, or zero by looking at the vector field. Verify by calculating the divergence for parts (a), (d), (e), (f), and (g).

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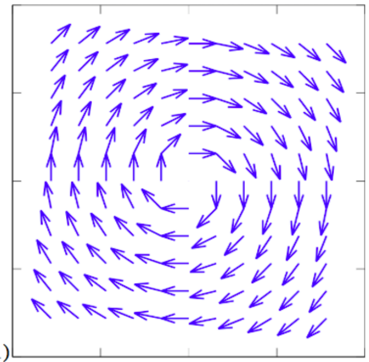
3. For each, decide whether the curl around the z-axis is positive, negative, or 0. Verify by calculating $Q_x - P_y$ for (a), (d), (e), (f), and (g).

1)



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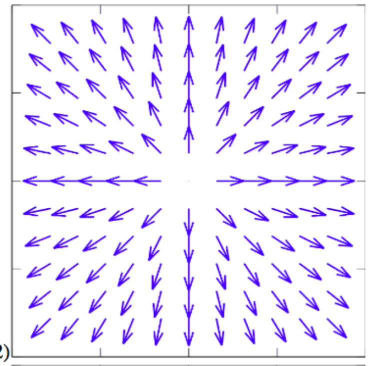

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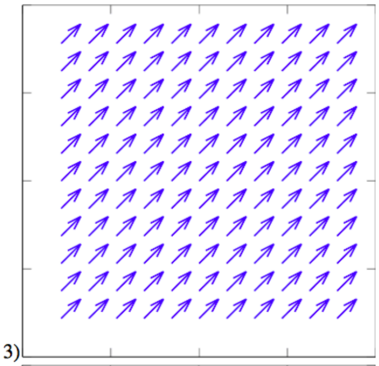

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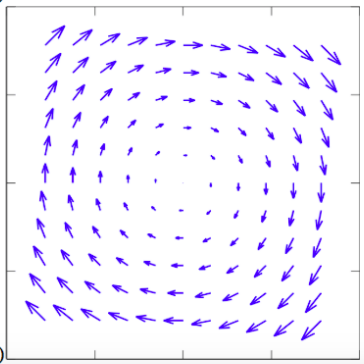

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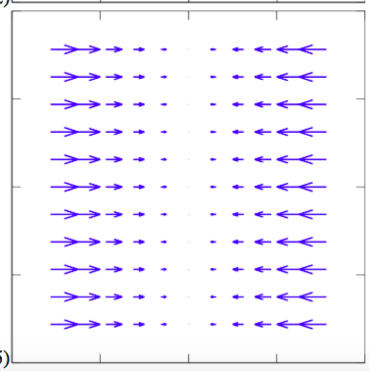

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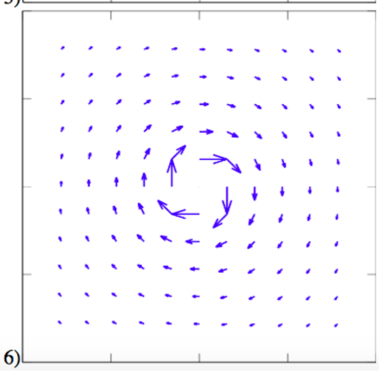

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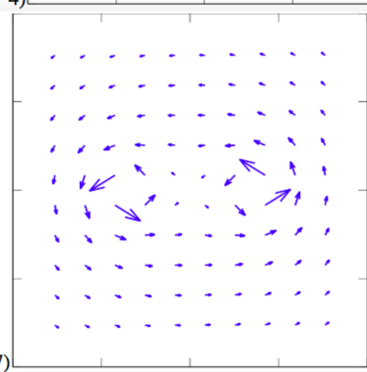

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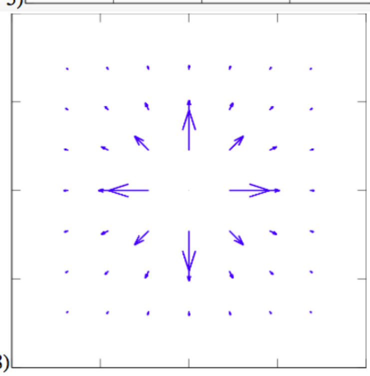

9)